

Transport noise Visual integration



NZ TRANSPORT AGENCY
WAKA KOTAHI

NOISE BARRIER CASE STUDY 7

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Noise barriers adjacent to the new Maoro Street Interchange.

Maoro Street Interchange

An earlier stage of the Western Ring Route (WRR) in Auckland was the SH20 Mount Roskill Extension (2005–2009), which created a temporary termination of SH20 at the local road Maoro Street. Noise barriers were installed around the temporary junction as part of that project. The adjoining Waterview Connection project (2012–2017) will extend SH20 further to the north of Maoro Street to complete the WRR. In preparation for the Waterview Connection, the Maoro Street Interchange project (2010–2011) constructed a new half-diamond interchange between SH20 and Maoro Street. Additional and retrofitted noise barriers were installed as part of the project.

A requirement of the project was to use where possible the existing barriers in order to keep costs down and to replace and build new barriers where the realignment of the road required it. The project also gave the NZTA an opportunity to retrofit what were recognised as visually substandard barriers to achieve a better visual outcome for the local community and road users. The design concept was developed as part of the Urban and Landscape Design Framework (ULDF) for the Waterview Connection project and was based on a 'volcanic highway' theme of overlapping and contrasting materials and textures, with red, orange and gold colours on a black background.



Barrier colours following the Waterview Connection ULDF.

This case study examines the methods used to visually integrate the old and new noise barriers. Additionally the case study discusses the robust specification that led to the use of a proprietary engineered barrier product that, compared with simple custom-made sheet plywood barriers, has better durability, is less prone to warping or developing gaps, and is 'finished' on both sides.

Barrier specification

In an urban environment, concrete noise barriers are usually preferred for maintenance reasons. However, to integrate with the existing timber noise barriers, the specification required an engineered plywood panel (and steel post supports). The specification was comprehensive and included details such as:

- treatment, painting and anti-graffiti coating
- 'locking' system to prevent warping
- 40-year design life.

A specific product was named ('Ezyshield' from Boral) for the plywood panels, although an equivalent product would have been allowed. Ezyshield has been discontinued by Boral but an identical product named 'Nuibarrier' is sold in New Zealand by Gunnersen.

Barriers used on NZTA projects have often been simple custom-made plywood sheet systems of a lesser specification, rather than a tested and engineered panel. The existing barriers at the interchange were all a simple plywood sheet system.

The cost, including supply, installation, support posts and painting, for the high-specification plywood panel barrier system was just over \$1000 per linear metre for an average height slightly above 3 metres. This compares to \$400 per linear metre quoted for a single-sided 3-metre high timber barrier in NZS 6806 and the NZTA's *State highway noise barrier design guide* and \$600 per linear metre for a 3-metre high single-sided plywood panel barrier system installed elsewhere for the NZTA in 2011 (case study 8). Data is not available, but it is expected that the long-term maintenance for the high-specification barrier system will be significantly less than a simple plywood sheet system.

On one side of the interchange, an agreement with the adjacent school resulted in concrete rather than timber barriers. The tendered price for the concrete barriers was \$1100 per linear metre for an average height slightly above 3 metres.

Visual integration

The opportunity was taken to improve the visual treatment of the existing barriers. Prior to the construction of the new interchange, the existing barriers comprised unpainted sheet plywood panels just on the road side of timber framing fixed between steel posts. The road side of the panels also had vertical wooden strips applied. Over time as these barriers had been tagged, maintenance teams had painted out the graffiti. Where these barriers have remained, they have been integrated with the new barriers by painting on the road side with the black, red, orange and gold colour scheme of the ULDF. As shown in the photographs below, work was also undertaken to remove the large visually jarring steps from the top of the noise wall to provide more regular and smaller changes in height.

The Ezyshield system used for the new barriers has horizontal grooves and panels. To match the appearance of the original panels, additional vertical wooden strips were applied, as shown in the adjacent photograph. Likewise, vertical features mimicking the strips were cast into the panels of the concrete barrier.

As part of the project risk management, potential construction and future maintenance issues were identified in areas only accessible from residential sections. Therefore, the side of the existing barriers facing residents was not painted or panelled as part of the remedial work.



Original barriers on Maioro Street with a poorly designed height step and single-sided panelling.



Integrated barriers on Maioro Street.

Land ownership

While all barriers have been installed by the NZTA, some are located on NZTA land but others are on Auckland Council land. Responsibility for maintenance rests with the land owners. Initially, the council preferred single-colour barriers to minimise maintenance costs, although experience has shown that non-uniform colours deter graffiti. However, in order to provide continuity in the barrier appearance, agreement was reached between the NZTA and the council to retain the ULDF colour scheme with red, orange and yellow stripes on a black background throughout.



Ezyshield plywood panel with additional vertical strips.

Lessons learnt

- Using detailed noise barrier specifications, which require engineered products, avoids several issues that have occurred on other NZTA projects using simple custom-built sheet plywood systems. (Refer to the NZTA's *Noise barrier case study 8*.)
- Where new barriers are to be installed in the same area as existing barriers, relatively simple steps can be taken to achieve visual integration as described in this case study.
- A ULDF is an essential part of noise barrier design.
- If noise barriers are to be constructed on land not owned by the NZTA (or to be divested by the NZTA following the project), then responsibilities for maintenance should be determined at an early stage in the project. This consideration should include painting and colour schemes, particularly where multiple colours are proposed.
- A proprietary engineered timber noise barrier was over twice the construction cost indicated for timber noise barriers in NZS 6806 and the NZTA's *State highway noise barrier design guide*. The maintenance costs are likely to be lower than for simple sheet plywood barriers.
- Single-sided barriers should be avoided.

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